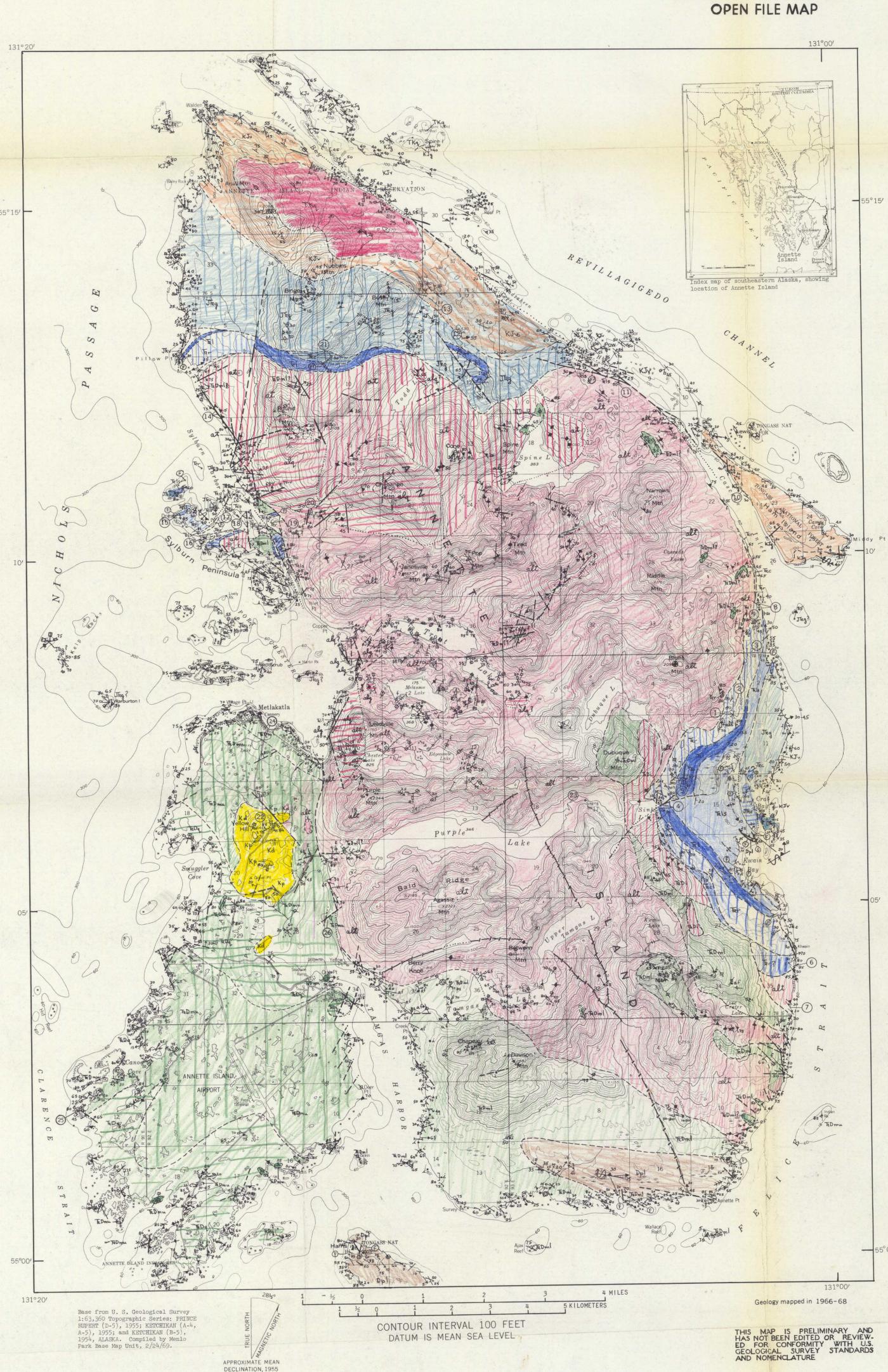
U.S. GEOLOGICAL SURVEY



PRELIMINARY GEOLOGIC MAP OF ANNETTE ISLAND, ALASKA Henry C. Berg 1969

(Mapped area of each of units described may contain minor areas of other units too small to represent at scale of map)

EXPLANATION

Pluton southwest of Annette Bay is greenish-gray, fine-grained, hypidiomorphic granular to porphyritic quartz diorite and subordinate diorite consisting of altered subhedral plagioclase and hornblende, interstitial quartz, and accessory apatite, sphene, and pyrite. Plagioclase generally converted to fine-grained clinozoisite and sericite; hornblende to ctinolite and minor chlorite. Locally abundant veiniets and disseminated grains of epidoteclinozoisite and sericite. In general, pluton is not strongly deformed. Apparently is intrusive into Pluton at Spire Island is brownish-gray, mediumgrained, hypidiomorphic granular to gneissic, leucocratic quartz diorite composed of quartz, altered plagioclase, and subordinate muscovite, chlorite, clinozoisite-epidote, sphene, apatite, and calcite. Plagioclase replaced by relatively coarsely crystalline aggregate of muscovite and clinozoisite. Intrudes KJg, which, near contact, is thermally metamorphosed to andalusite-bearing

Dunite and pyroxenite Contact between rock types is inferred Partly (10-30%) serpentinized dunite and subordinate clinopyroxenite (Kp). Clinopyroxenite occurs as dikes and as bodies of uncertain, but possibly layered, structure. Dunite contains thin seams of asbestos, and sparse veinlets and disseminated grains of chromite (also see no. 22 in List of fineral Occurrences). Internal deformation (deformation lamellae, kink bands, folded chromite streaks), bounding faults and shear zones, and absence of thermal effects in enclosing rocks indicate that dunite is tectonically emplaced

Alpine-type ultramafic

Intermediate metavolcanic rocks, phyllite, graywacke semischist, phyllitic conglomerate KJv, light and medium greenish-gray, foliated, recrystallized dacitic and andesitic volcanic and volcani-clastic rocks; interbedded with silvery-green and subordinate dark-gray lineated phyllite. Minor graywacke semischist and phyllitic conglomerate. Lower greenschist facies mineral assemblage includes albite, quartz, chlorite, actinolite, epidote-clinozoisite, calcite, sphene, apatite, pyrite. Relict textures in metavolcanics include porphyritic, aphanitic, amygdaloidal and fragmental; locally, appreciable relict hornblende phenocrysts. Phyllitic conglomerate consists of sheared, flattened clasts of porphyritic and aphanitic intermediate metavol-canics, fine-grained metasedimentary rocks, and minor leucocratic intrusive igneous rocks, in a matrix of dark-gray phyllite. North of Crab Bay unit is mixed with intermediate intrusive igneous rocks and locally converted to epidote-almandine-actinolite hornfels. Unit grades downward into JRg by increase in phyllite and graywacke semischist, and laterally into KJg by increase in phyllite, graywacke semischist and phyllitic conglomerate
KJg, interbedded dark-olive and dark-gray lineated phyllite, graywacke semischist, and phyllitic conglomerate; minor phyllitic calcareous siltstone, limestone, metachert, and intermediate metavolcanics Phyllitic conglomerate at Walden Rocks contains moderately to strongly deformed, subrounded to rounded clasts up to 4 feet long in dark-gray phyllite and phyllitic grit matrix. Clasts include dark-gray phyllite, metagraywacke, porphyritic and aphanitic intermediate metaigneous rocks, dark-gray phyllitic limestone, fine-grained metasedimentary rocks, rare mafic igneous rock. In general, unit contains lower greenschist facies mineral assemblage quartz, albite, sericite, actinolite, epidote-clinozoisite; pyrite locally abundant. Near contact with quartz diorite on islet east of Spire Island, metagraywacke and phyllite are thermally metamorphosed to hornfels and

schist containing andalusite, sericite, fine carbonaceous material, and subordinate quartz, plagioclase,

Graywacke semischist, phyllite, phyllitic conglomerate, intermediate metavolcanic rocks JEg, interbedded dark-gray graywacke semischist and dark-gray to dark-olive-green lineated phyllite; subordinate yellowish-green and greenish-gray dacitic and andesitic metavolcanic rocks including phyllitic hornblende and hornblende-plagioclase porphyry aphanite, breccia and agglomerate minor dark-gray phyllitic conglomerate lightgray very fine grained limestone and phyllitic siliceous siltstone. Thin-bedded limestone and siliceous siltstone on reef south-southwest of Gull Island in Port Chester contains spheroidal concretions up to l inch in diameter that may be organic. In general, unit contains lower greenschist facies mineral assemblage quartz, albite, sericite, epidoteclinozoisite, actinolite, chlorite. Metavolcanic parts are relatively rich in actinolite, epidote, chlorite; some contain relict hornblende phenocrysts. Carbonaceous phyllite on shoreline of Hassler Harbor due west of Pow Island contains abundant millimeter-sized subhedral crystals of spessartite(?) garnet, plus quartz and chlorite

JRc, phyllitic conglomerate and volcanic clast-rich breccia. Metamorphic
mineral assemblage is similar to that in JRg. In Kwain Bay, Crab Bay, and Hemlock Island areas consists of light-green to dark-gray foliated conglomerate containing flattened, sheared clasts up to several feet long of intermediate metavolcanic rocks, dark-gray phyllite and fine-grained detrital rocks, and dark-gray limestone. Matrix is lineated dark-greenishd phyllitic grit. In Kwain Bay, lower part of mit contains abundant slabs and discontinuous layers of dark-brownishgray phyllitic limestone carrying Upper Triassic fossils. In Kwain Bay, unit grades into Tels by increase in phyllite and phyllitic silty lime-stone; south of Kwain Bay, unit unconformably overlies Ter. Near Pillow Point, unit unconformably(?) overlies Tel and Ter, and consists of carbonate-cemented breccia containing angular clasts of slightly altered andesite. Breccia grades laterally into JRv pillow lava, and upward, through phyllitic conglomerate and grit, into Jæg phyllite and graywacke semischist. Phyllitic conglomerate and grit has calcareous phyllitic matrix and contains mildly to moderately deformed clasts up to 6 inches in maximum dimension of altered andesitic volcanic rock similar to that in JRv pillow lava, leucocratic intrusive igneous rocks, and sparse K-feldspar-rich igneous rocks similar to those in Rr; it also contains sparse carbonate concretions, some of which carry belemnite-like organic(? structures that might be Jurassic in age
JRv, intermediate metavolcanic rocks. At Pillow Point consists of slightly to moderately altered andesitic pillow lava and pillow breccia; on Sylburn Peninsula consists of metaandesite clast-bearing tuffaceous(?) sandstone and breccia. Lava at Pillow Point consists of deformed and broken pillows up to 2 feet in diameter in a matrix of limestone (calcite) and altered volcanic material. Pillows are light greenish gray, very fine grained, and consist of a relict intersertal-felty aggregate of zoisite(?) zeolite(?), and indeterminate minerals, plus interstitial partly devitrified glass, and millimeter-sized calcite-filled vesicles. Tuffaceous(? unit on Sylburn Peninsula is marine, dark olive green, thin to medium bedded, and consists of abundant deformed clasts up to a foot long of altered andesitic volcanic rock in a platy-fissile sandy matrix rich in calcite and chlorite. Some clasts are amygdaloidal; some resemble pillow breccia at Pillow Point. Weathered surfaces of unit have conspicuous pock-

marked or "Swiss-cheese" appearance

felsic metavolcanic rocks; phyllitic conglomerate and breccia Æls, dark-gray pyritic phyllite and subordinate phyllitic calcareous siltstone and carbonaceous limestone. Numerous small folds and lineations. Contains lower greenschist facies mineral assemblage sericite, quartz, albite, chlorite, calcite, clinozoisite. Contains lower and middle Norian fossils in lower part, and upper Norian fossils in upper part. At Driest Point, upper part of unit overlies &r rhyolitic ash- and lapilli-rich carbonate beds with slight structural discordance; formations are separated by up to 1-foot-thick zone of iron-stained rock that migh be fossil soil. In inner Sylburn Harbor area and northeast of Hemlock Island, lower part of unit grades laterally into %c. Estimated maximum thickness of unit Rl, massive, cavernous, dark-bluish-gray, very fine grained limestone; locally dolomitic. Grades upward and laterally into % ls. Locally contains fossils presumed to be early and middle Norian in age. In Kwain and Crab Bays area and near Pillow Point, conformably overlies % r. Distribution of unit northwest of Todd Lake and southeast of Fujii Lake is highly speculative due to poor exposures. Northwest of Todd Lake may interfinger in part with Æc; southeast of Fujii Lake appears to be tectonically mixed with Jæg. Estimated maximum thickness of unit is 200 feet The results of the state of Annette Island (Kwain Bay-Crab Bay area), consists chiefly of light-gray and light-brown quartz-sericite-K-feldspar albite-carbonate schist and subordinate light-silvery-green quartz-sericite phyllite derived from rhyolitic to dacitic lava flows, ash flows, and tuff. Unit generally is recrystallized to platy,

LOCAL UNCONFORMITY

nonfissile schist, but relict spherulitic, vitric, fragmental, pumiceous, aphanitic, and porphyroaphanitic textures locally are preserved. Ær? south of Kwain Bay consists of alternately red and green weathering thin (<1 foot) beds of very fine grained carbonate-quartz-sericite-plagioclase-K-feldspar schist interpreted as recrystallized, tuffaceous dolomitic limestone that may be equivalent to ash- and lapilli-rich carbonate beds at top of Ær at Driest Point. On west side of Annette Island, unit is deformed and recrystallized, but less penetratively foliated than on east side of island. Metamorphic mineral assemblage is that of lower greenschist facies and includes quartz, sericite, K-feldspar, albite and carbonate. On Sylburn Peninsula and southeast of Pillow Point, consists of massive to thinly laminated black, white, light-brownish-gray, and, less commonly, pink, green, and red aphanite locally with prominent spherulitic texture, and subordinate light-gray and silverygreen phyllite and phyllitic aphanite. At Driest Point, light-gray aphanite is overlain by about 50 feet of thin- to medium-bedded marine rhyolite tuff and rhyolitic ash- and lapilli-rich dolomitic limestone. Similar rocks also crop out in small cove on south side of Sylburn Peninsula about 0.7 mile southeast of Driest Point, and near Pillow Point. Estimated maximum thickness of unit is 600 feet & c, phyllitic conglomerate and carbonate-cemented breccia, grit, and conglomerate. On east side of Annette Island, unit consists of elongate lenses up to 50 feet thick of light-greenish-gray quartz-sericite-albite schist and phyllite containing prominent angular to ellipsoidal relict clasts up to 1 foot in diameter of leucotrondhjemite, leucocratic quartz diorite, and relatively sparse PDMI metamorphic rocks. Southeast of Sink Lake apparently is in depositional contact with underlying Annette pluton, and gradationally overlain by Par dacitic metatuff. This postulated based Unper Trigogic unit is interpreted as a foliated recrystallized subaerial ash Annette pluton, and gradationally overlain by Rr dacitic metatur. This postulated basal Upper Triassic unit is interpreted as a foliated, recrystallized subaerial ash flow tuff rich in detritus accumulated by the ash flow as it advanced over exposed, predominantly granitic terrain. On west side of Annette Island, unit consists of massive to phyllitic, chaotic to well-bedded, brown-, green-, and red-weathering, carbonate-cemented breccia, grit, and conglomerate containing abundant clasts up to 2 feet in maximum dimension of leucocratic quartz monzonite and granodiorite, leucotrondhjemite, fragmental quartz and plagioclase, and subordinate metarhyolite, limestone, and foliated fine-grained detrital rocks. In general, clasts are poorly size sorted, but locally, such as along shoreline of Sylburn Peninsula northeast of Hemlock Island, and on ridge northwest of Todd Lake, they are rounded and well sorted. Matrix in massive and well-bedded varieties is brown-weathering dolomitic carbonate, plus minor sericite, hematite, and calcite, and K-feldspar in sparsely disseminated thin seams; matrix in phyllitic variety includes sericite, microgranular quartz and albite(?), hematite, and calcite. Unit grades upward and laterally into %r, and, locally, into %ls and %l. Estimated maximum thickness

> UNCONFORMITY Contacts between facies are gradational or inferred

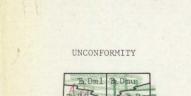
of unit is 500 feet

Predominantly leucocratic, hypidiomorphic granular, schistose, and, locally, gneissic, medium-grained intrusive rocks. In most places, pluton is bounded by strongly foliated protoclastic border zone up to several hundred feet wide; deformation diminishes toward center of pluton, but all parts show at least mild protoclasis, diminishes toward center of pluton, but all parts show at least mild procedus; including strained quartz, bent plagioclase crystals, intergranular mortaring, and veinlets of microgranular quartz and plagioclase. Contact effects in intruded rocks are slight, in general consisting of a thermal selvage a few inches wide; this feature, together with protoclastic textures, suggest that pluton probably was emplaced at relatively low temperature and in an advanced state of crystalligible. Pluton is out by pumprous languages, dikes of very fine grained lamellar. was emplaced at relatively low temperature and in an advanced state of crystallization. Pluton is cut by numerous leucocratic dikes of very fine grained, lamellar to spherulitic quartz-albite-sericite(-K-feldspar) aplite, aphanite, and porphyroaphanite, and by less abundant dark-green dikes of altered microdiorite. The leucocratic dikes are interpreted as having crystallized from a silica-alkali-volatile-rich residuum during final consolidation of the Annette pluton; the intermediate dikes probably postdate the leucocratic dikes alt, leucotrondhjemite. Light-greenish- and brownish-gray, medium-grained intrusive rock consisting of about 60% partly albitized sodic oligoclase, 30% quartz, 0-5% K-feldspar, 0-10% sericite, and less than 5% of one or more of the following minerals: biotite, muscovite, colorless amphibole, chlorite, epidote-clinozoisite, calcite, apatite, sphene, zircon, tourmaline, hematite, and magnetite. In general, sericite occurs in very fine grained aggregates lightly replacing plagioclase, but locally, especially in the more strongly deformed parts of the intrusive, it forms ramifying, subparallel veinlets and irregular masses that, together with quartz, albite(), and minor chlorite and calcite, appear to replace substantial parts of the rock. Protoclastic border zone includes fine- to medium-grained, locally contorted quartz-sodic oligoclase-sericite augen schist and subordinate microbreccia; interior of intrusive is relatively massive, nonfoliated, hypidiomorphic granular of intrusive is relatively massive, hontoffaced, hypothemorphic granular alg, leucocratic granite, leucocratic quartz monzonite, and leucocratic granodiorite. Virtually identical to leucotrondhjemite, but contains more than 5% K-feldspar, chiefly microcline and microperthite. Grades into alt by decrease in K-feldspar at, trondhjemite. Medium and dark-greenish-gray, medium-grained intrusive rock at the contained and the contained and contained in the contained and contained consisting of about 60% partly albitized sodic oligoclase, 30% quartz, 0-5% K-feldspar, and up to 10% ferromagnesian minerals, chiefly chlorite and subordinate hornblende and biotite. Alteration and accessory minerals include sericite, epidote-clinozoisite, colorless amphibole, calcite, apatite, sphene, magnetite.

Degree of sericitization ranges from relatively light replacement of plagioclase to locally intense replacement of most of rock by veinlets and irregular masses of sericite. Texture ranges from hypidiomorphic granular to moderately foliated to gneissic; protoclastic textures are ubiquitous and range from mild intergranular mortaring to intense milling and microbrecciation. Grades into alq by increase in ferromagnesian minerals
alq, leucocratic quartz diorite; minor hornblende diorite. Medium and dark-greenishgray, medium-grained, mildly to moderately altered, hypidiomorphic granular to
gneissic intrusive rock composed of about 65% oligoclase, 15-25% quartz, 0-5% K-feldspar, and 10-15% ferromagnesian minerals including hornblende, biotite, and chlorite, plus minor sphene, apatite, epidote-clinozoisite, sericite, calcite. Flow foliation locally present, but little, if any, evidence of protoclastic deformation. Field relations suggest that this facies of Annette pluton may predate main leucotrondhjemite. Altered hornblende diorite (alq?), consisting of dark-green, medium-grained, hypidiomorphic granular to foliated intrusive rock containing about equal parts of strongly altered plagioclase and ferromagnesian minerals, is interpreted as relatively mafic phase of alq

Phyllite, phyllitic detrital rocks, limestone, dolomite Metamorphic mineral assemblage includes quartz, sericite, chlorite, epidoteclinozoisite, carbonate, leucoxene; other constituents include very fine grained carbonaceous material, pyrite, sparse detrital zircon. On southern Annette Island, unit consists of thin- to medium-bedded, dark-silvery-gray, strongly lineated, pyritic phyllite; dark-gray phyllitic calcareous siltstone and silty limestone; feldspathic to arkosic graywacke semischist; phyllitic grit, conglomerate, and breccia consisting of clasts of leucocratic intrusive rocks, fragmental quartz and plagioclase, fine-grained detrital rocks, and limestone in a matrix of dark-gray phyllite and calcareous siltstone; red-weathering dolomitic limestone dark-gray phyllite and calcareous siltstone; red-weathering dolomitic limestone and arenaceous dolomite; and locally abundant dark-brown, olive, and light-greenish-gray phyllite. Dark-gray phyllite and calcareous siltstone, and dolomitic limestone locally contain fossils of Middle Devonian age. In Kwain Bay, unit includes dark-gray pyritic phyllite and light-gray phyllitic calcarenite and limestone breccia. Limestone locally contains fossils of Middle Devonian age. On Harris Island and northern Hotspur Island, unit consists of thin- to medium-bedded, clark to phyllitic dark-gray limestone and limestone-clast conglowerate, darkslaty to phyllitic, dark-gray limestone and limestone-clast conglomerate; darkgray pyritic phyllite; thin-bedded, lenticular, and concretionary, maroon-weathering, light-greenish-gray, very fine grained dolomite; dolomite-cemented feldspathic siltstone; calcareous siltstone; and greenish-gray phyllite. Numerous lineations and small folds. Limestone and calcareous siltstone locally contain fossils of

Early and Middle Devonian age



Metamorphosed sedimentary and igneous rocks PLDml, undivided lower greenschist facies metamorphic rocks. Locally mixed, and in part gradational with, foliated intrusive rock (RDi) composed of quartz, albite, chlorite, epidote-clinozoisite, and sericite. Unit includes: sericite-albite-quartz(-chlorite-epidote) schist derived from feldspathic to arkosic graywacke and grit, conglomerate rich in clasts of leucocratic intrusive rocks, and felsic tuff(?); carbonate-sericite-quartz-chlorite (-epidote-clinozoisite) schist derived from calcareous siltstone, mudstone, silty limestone, graywacke, and dolomitic limestone; quartz-sericiteplagioclase-chlorite(-K-feldspar-carbonate-hematite) schist derived from felsic to intermediate igneous rocks; chlorite-albite-epidote(-quartzschist derived from intermediate and basic igneous rocks (greenschist, greenstone); quartzite. On northern Metlakatla Peninsula, unit comprises a distinctive sequence of thin-bedded, dark-green and dark-brown, moderately to strongly foliated dacitic to andesitic metavolcanic rocks and subordinate graywacke semischist, phyllite, and phyllitic siltstone and conglomerate. Relict textures in the metavolcanics include porphyritic (relict plagioclase and subordinate, but locally predominant, hornblende phenocrysts), intergranular, felty/trachytic, fragmental, amygdaloidal. Metamorphic mineral assemblage includes albite, quartz, epidote-clinozoisite, chlorite, sericite, colorless to blue-green amphibole, minor calcite and hematite, and, locally, very sparse fine-grained biotite. Sequence grades into % Dmu by increase To Dmu, undivided upper greenschist facies metamorphic rocks. Chiefly quartz-plagioclase-biotite-blue/green hornblende-chlorite-epidote schist, gneiss, and hornfels derived from bedded sedimentary and intermediate volcanic rocks. Locally mixed, and in part gradational with, foliated intermediate granitic rock. With increase in granitic rock grades into foliated hornblende-biotite quartz diorite and diorite (RDq). RDmu mapped where volume of metamorphosed bedded rocks is greater than volume of granitic rock; PaDq mapped where volume of granitic material is greater. In addition to upper greenschist facies mineral assemblage, part of unit, especially the foliated granitic rock and contiguous parts of the metamorphosed bedded rocks, contain

plagioclase near oligoclase or andesine, suggesting that at least part of

60 af, f, i

MISCELLANEOUS INTRUSIVE ROCKS

Showing attitude of laminae (felsic dikes only) or of contact with enclosing rocks af, dikelike (dike symbol) and irregular (dot symbol) apophyses of Annette pluton. Includes porphyritic, intergranular, and aplitic leucotrondhjemite, and leucocratic quartz monzonite and granodiorite. On Hemlock Island, includes fault slivers of Annette pluton. f, felsic dike. Includes quartz-albite-sericite (-k-feldspar) aphanite and porphyroaphanite; locally spherulitic, commonly laminated. i, intermediate dike. Includes altered andesite, microdiorite, and fine-grained hornblende and nornblende-plagioclase porphyry.

Complexly mixed intrusive and metamorphosed bedded rocks. Letter symbol indicates af, see under "dike"
i, undivided intermediate and felsic intrusive rocks. Intermediate varieties include quartz diorite and diorite; relatively felsic varieties include leucocratic quartz diorite and aplite.
m, mafic intrusive rocks, chiefly hornblende and pyroxene gabbro.

• af, i, m

Planar and linear symbols may be combined

Contact, showing dip; overturned contact Dashed where approximately located; dotted where inferred, gradational, or, in alluvium- or water-covered areas, concealed; queried where doubtful

-/-/-/-

Topographic lineament interpreted

from aerial photographs 60 10 U Fault, showing dip, rake of slickensides, relative movement Faults without attitudes are presumed to be vertical. Dashed where approximately located; dotted where concealed. U, relatively

upthrown side; D, relatively downthrown side 20 Thrust fault, showing dip

Dashed where approximately located Arch Open warps Anticline Syncline Overturned anticline Overturned syncline Generalized attitude of

> Folds Showing, where appropriate, crestline, troughline, direction of dip of limbs, plunge, and dip of → 40 Inclined Horizontal Fold axes Beds too tightly folded to show individual folds 60 65

+ + + Inclined Overturned Vertical Horizontal Inclined Overturned Strike and dip of beds Ball indicates top of beds known from sedimentary structures △ ◆ Ø △ 80

Inclined Vertical Horizontal Parallel bedding and foliation Strike and dip of foliation in metamorphosed bedded rocks **→** • Inclined Vertical Horizontal Strike and dip of foliation in intrusive rocks 85 Inclined Vertical Strike and dip of cleavage

→30 ↔

Inclined Horizontal Bearing and plunge of lineation alinement, boudinage, mullions, bedding-cleavage-foliation intersections, and kink folds Inclined Vertical Horizontal

> Strike and dip of joint or joint set ----Direction of glacial grooves, striae

Fossil locality Mineral occurrence

MINERAL OCCURRENCES DESCRIPTION

LOC. NUMBER Three-foot wide quartz stringer lode in metarhyolite breccia: 0.04 oz. Au/ton One-foot wide streak of chalcopyrite, galena, and pyrite in quartz vein in metarhyolite: 0.04 oz. Au/ton; 20.60 oz. Ag/ton; 9.75% Pb; 4.63% Cu; 13.14% Zn Chalcopyrite, galena, and pyrite in 2-foot wide quartz vein in metarhyolite: 0.05 oz. Au/ton; 1 *34AK409b 13.20 oz. Ag/ton; 4.00% Pb; 1.86% Cu; 5.00% Zn Relatively barren quartz vein about 4 feet wide and several hundred feet long in metarhyolite: 0.04 oz. Au/ton; 0.92 oz. Ag/ton; 0.05% Cu; 0.21% Zn 110-foot long northeast-trending adit in iron-stained rhyolite microbreccia. Microbreccia contains traces of chalcopyrite, pyrite, and hematite
Iron-stained north-northeast-trending shear zones up to 10 feet wide and 40 feet long in metarhyolite. Zones contain vuggy quartz and disseminated pyrite
1.5-foot wide quartz vein in metarhyolite: 0.36 oz. Au/ton; 0.91 Oz. Ag/ton; 2.00% Po; 0.63% Cu; 3 *34AK412a Three-foot wide quartz vein in shear zone in metarhyolite: 0.43 oz. Au/ton; 0.34 oz. Ag/ton; 3 *34AK412b 0.64% Pb; 0.85% Cu; 16.75% Zn Sulfide-bearing quartz lenses and veins in either limestone or metarhyolite. Sulfides, which occur 4 *34AK414a both in the quartz and in the country rock near the quartz, consist of tetrahedrite and galena, plus a little chalcopyrite, covellite, and chalcocite, and a trace of ruby silver: 0.03 oz. Au/ton; 9.64 oz. Ag/ton; 12.43% Pb; 1.28% Cu; 0.56% Zn Disseminated magnetite and secondary copper minerals (malachite, azurite) in leucocratic quartz diorite adjacent to northeast-trending fault Traces of hematite and secondary copper minerals in inch-wide quartz and calcite veinlets in dolomitic Small stringers and disseminated grains of galena, pyrite, and chalcopyrite in brecciated dolomitic Veinlets and disseminated grains of magnetite in fault breccia in schist Traces of chalcopyrite, malachite, pyrite, and hematite in sheared aplite and leucocratic quartz monzonite. Metallic minerals occur in iron-stained zones an inch or so wide and about a foot long Quartz lenses and veins up to 30 feet wide and 100 feet long in phyllite and metarhyolite. Some of the veins contain small amounts of galena, pyrite, and marcasite(?)
Small amounts of sphalerite, chalcopyrite, pyrite, and galena in metarhyolite(?) Traces of gold in beach placer material and in quartz float near quartz-bearing slate and graywacke Sparsely disseminated chalcopyrite in foliated leucotrondhiemite *34AK142, 416a Quartz lenses and veins up to 10 feet wide and several hundred feet long in phyllite and fine-grained schist. Quartz and country rock near quartz contain small amounts of disseminated pyrite and galena, and a few specks of gold: 0.71 oz. Au/ton; 0.91 oz. Ag/ton Iron-stained quartz veins in zone up to 8 feet wide in dark-gray phyllite Galena in thin, discontinuous calcite-quartz fissure veins in subhorizontal shear zone up to 20 feet thick and several hundred feet long. Grab sample assayed in July, 1968 by Alaska Division of Mines and Minerals: 1.38 oz. Au/ton; 0.42 oz. Ag/ton Crushed metarhyolite cut by sparse veinlets containing quartz, calcite, barite, and a few specks of galena East-northeast-trending ten(?)-foot wide shear zone in metarhyolite. Zone contains calcite and quartz veins carrying barite and hematite, plus small amounts of galena, chalcopyrite, and pyrite 17 66ABg208 and Barite-calcite veins in iron-stained brecciated metarhyolite. Outcrop of barite-bearing rock is 150 square feet in area 18 66ABg198 and South-trending ten(?)-foot wide shear zone in brecciated metarhyolite. Zone contains veins and 68ABg76

19 68ABg90

68ABg90

68ABg90

67ABg294, 295

67ABg294, 295

South—trending ten(?)—foot wide shear zone in in the tractated mounts of hematite and galena irregular masses of barite and calcite, plus small amounts of hematite and galena guartz veinlets containing chalcopyrite, pyrite, hematite, and secondary copper minerals in brecciated sericitized leucotrondhiemic. Veinlets occur in breccia zones up to one inch wide and several feet long sericitized leucotrondhiemic and felsic aphanite. Also present at locality are foot—thick pieces of quartz brecciated leucotrondhiemic and felsic aphanite. Also present at locality are foot—thick pieces of quartz lend to extaining small amounts of chalcopyrite, pyrite, malachite, and magnetite

float containing small amounts of chalcopyrite, pyrite, malachite, and magnetite Trace of malachite in conglomerate 66ABg182, 184 Partly serpentinized dunite containing scattered thin seams of asbestos and sparse veinlets and disseminated grains of chromite. A random sample of massive dunite contained 0.029 ppm Pt, but less than 0.005 ppm Rh and Pd No field station Location approximate. Disseminated chalcopyrite in leucotrondhiemite
67ABg 340
67ABg 456a
68ABg 270

Thin stringers, streaks of pyrite and chalcopyrite in schist and gneiss
Very sparsely disseminated pyrite and chalcopyrite in schist and hornfels

*Location approximate. Mapped and sampled in 1934 by A.H. Koschmann and H. Coombs, U.S. Geological Survey. Data are from their unpublished field notes. Samples analyzed by chemical and spectrographic methods by E.T. Erickson and G. Steiger, U.S.G.S.,